



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/658,398	09/10/2003	Naoki Yasui	648.42465CX1	2253

20457 7590 05/17/2005

ANTONELLI, TERRY, STOUT & KRAUS, LLP
1300 NORTH SEVENTEENTH STREET
SUITE 1800
ARLINGTON, VA 22209-3873

EXAMINER

AHMED, SHAMIM

ART UNIT	PAPER NUMBER
----------	--------------

1765

DATE MAILED: 05/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/658,398

Applicant(s)

YASUI ET AL.

Examiner

Shamim Ahmed

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 13-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 September 2003 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☒ Certified copies of the priority documents have been received in Application No. 10/358,894.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: At page 7, line 16, the phrase "wafer 102" should be replaced with "plate 102" in order to make consistence with the disclosure in line 19 and also with the figure 1.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
3. Claim 16 and 19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
4. Claim 16 recites the limitation "the means for clipping voltage" in line 2 and the limitation of the "inclination of the clip voltage" in line 5. There is insufficient antecedent basis for this limitation in the claim because claim 13 does not recite "means for clipping voltage" and claim 14 does not recite "inclination of the clip voltage".
5. Claim 19 recites the limitation "the duty ratio" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

Art Unit: 1765

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 13-14,17 -20 are rejected under 35 U.S.C. 102(b) as being anticipated by Arai et al (6,110,287).

Arai et al disclose a plasma processing method for processing a sample using a plasma comprising the steps of:

- Providing a substrate in a plasma chamber considered to be in vacuum state;
- Supplying processing gas into the chamber and producing plasma with the help of a high frequency power supply (col.6, lines 13-35).
- applying bias voltage to a substrate electrode (55), which power is modulated with time in the form of a rectangular wave (see col.9, lines 66- col.10, line 2 and figs. 3 and 8) and flattening the voltage of the square wave through the use of an amplitude modulator for controlling an energy distribution of ions incident to said sample (see fig. 4 and col. 7-line 29 to col. 10, line 25).

As to claim 19, Arai et al teach that the waveform is controlled by a central controller 84 along with a voltage control filter and other accessories including wireless telegraphy to detect out values, which resemble the claimed sensor (col.10, lines 57- col.11, lines 12).

As to claim 20, the duty ratio of the waveform is inherently taught by the rectangular waveform shown in figure 8.

8. Claims 13 and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Quon et al (US Patent Application Publication No. 2003/0094239 A1).

Quon et al teach a plasma process including the steps of providing a substrate in a vacuum chamber 20 (Fig. 3A); a process gas feeding device and a plasma generator (not shown), a wafer electrode chuck 18 and a wafer bias power source including a low frequency (RF) power source 16 and a higher frequency (VHF) power source 14 and coupling circuit 12 arranged between the bias power sources and the wafer electrode, wherein the voltage applied to the wafer electrode having a flattened shape as shown in Fig. IB (abstract, paragraphs 0022-0024).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

Art Unit: 1765

not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Quon et al (US Patent Application Publication No. 2003/0094239 A1) in view of Kaji et al (US Patent No. 6,129,806).

Quon et al discuss above in the paragraph 8.

Quon et al fail to teach the voltage varies in an inclined manner with time.

Kaji et al teach a plasma processing apparatus (Fig. 1) comprising an electrostatic wafer electrode 15 and a bias voltage source wherein the bias voltage is pulsed and may have an inclined portion as shown in Figs. 7 and 8 in order to suppress the increase of the voltage difference between the ends of the electrostatic attracting film 22 accompanied by application of the pulsed bias to increase the pulse bias effect (column 17, line 18 through column 19, line 26).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to implement the pulse generating mechanism including the inclined waveform as taught by Kaji et al in the process of Quon et al in order to increase the bias effect on the electrostatic chuck as taught by Kaji et al.

Double Patenting

12. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11

Art Unit: 1765

F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

13. Claim 13 is rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-3 of U.S. Patent No. 6,806,201 in view of Tomoyasu et al (5,900,103). Although the conflicting claims are not identical, they are not patentably distinct from each other because in both cases the invention is directed to a plasma processing a substrate including an RF bias voltage coupled to a substrate electrode in which the voltage would have been modulated in order to form a flattened voltage waveform.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Holland (6,319,355) discloses plasma processing with variable substrate bias; Ogino et al (6,656,849) disclose a plasma reactor for achieving extension of etching parameters and improving selectivity with RF power fluctuation.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (571) 272-1457. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

Art Unit: 1765

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G. Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Shamim Ahmed
Primary Examiner
Art Unit 1765

SA
May 14, 2005